

REMARKS/ARGUMENTS

With the entry of the present amendments, Claims 3-10, 13, 14, 16, 34 and 35 are pending in this application. Claims 3, 4, 6, 8, 13, 14, 16, 34 and 35 have been amended to change their dependency from cancelled claim 2 to pending claim 9.

I. Interview Summary

Applicants thank Examiner Jung for taking the time to participate in the telephone interview of August 14, 2009. In that interview we discussed the differences between the prior art teachings and the subject matter of claim 9. It was agreed that the prior art (including Newsham) teaches that reactions between epihalohydrins and hydroxyl groups require a base catalyst in order to expose epoxy functional groups. Based on these teachings, the Examiner advised Applicants to file an after final response and indicated that the pending rejection of claim 9 would likely be withdrawn. The Applicants and the Examiner did not reach an agreement with regard to claim 1.

II. Rejection of Independent Claims 1 and 9 Under 35 U.S.C. § 103(a)

Claims 1-17, 34 and 35 were rejected under 35 U.S.C. § 103(a) as unpatentable over Wagner, Hubbell, Schössler and Newsham. With the entry of the present amendments, claims 1, 2, 11, 12, 15, and 17 have been cancelled, rendering the rejections moot with respect to these claims. Claims 3, 4, 6, 8, 13, 14, 16, 34 and 35 have been amended such that they now depend from independent claim 9.

The final office action (page 8, last paragraph) states, "Newsham teaches that the hydroxyl or amine functional groups can be reacted with epihalohydrin, which contains epoxy functional groups, in the presence or absence of a suitable catalyst or in the presence or absence of a suitable solvent (see entire document, particularly column 8, lines 33-44)." However, a careful reading of the entire cited paragraph reveals that Newsham teaches just the opposite, namely, that a catalyst is necessary to complete the reaction. Specifically, Newsham teaches:

"The epoxy functional novolac compositions of the present invention (Q=an epoxy group) can be prepared by reacting the corresponding hydroxyl or amine containing novolac with an epihalohydrin by any suitable means known to those skilled in the art. ... Generally, the hydroxyl or amine containing novolac is reacted with an epihalohydrin in the presence or absence of a suitable catalyst and in the presence or absence of a suitable solvent ... This initial reaction, unless the catalyst is an alkali metal or alkaline earth metal hydroxide employed in stoichiometric quantities, produces a halohydrin

intermediate which is then reacted with a basic acting compound to convert the vicinal halohydrin groups to epoxide groups. Reaction of the halohydrin intermediate and basic acting compound in the presence or absence of a suitable solvent is typically conducted at a temperature suitably from 0° to about 100°C...” (Col. 8, lines 33-57; Emphasis added.)

Thus, Newsham describes a two-step reaction to form an epoxy-functional novolac from a hydroxyl-functional novolac. In the first step a hydroxyl-containing novolac is reacted with an epihalohydrin in the presence or absence of a catalyst to form a halohydrin intermediate. *However, if the first step is conducted in the absence of an alkali metal or alkaline earth metal hydroxide catalyst, a second step is required, in which the halohydrin is reacted with a “basic acting compound” (i.e., a basic catalyst) to convert the vicinal halohydrin groups back into epoxide groups.* This second step is represented below (where B:⁻/B-H represents a basic catalyst):

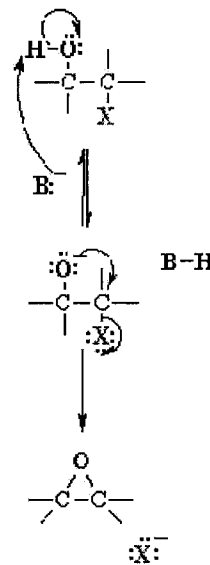
MECHANISM OF HALOHYDRIN TO EPOXIDE

Step 1:

An acid/base reaction. The base deprotonates the alcohol forming an alkoxide intermediate that has enhanced nucleophilicity.

Step 2:

An S_N2 reaction where the alkoxide nucleophile attacks the electrophilic C displacing the leaving group, the halide ion. The nucleophile has to attack *anti* to the C-X bond.



Therefore, Newsham actually strengthens Applicants' previous arguments that, at the time of the invention, the conventional method of reacting epoxy-functional molecules with hydroxyl groups was to conduct the reaction in the presence of a catalyst, and that the accepted wisdom was that reactions between hydroxyl-groups and epoxy groups on molecules such as epihalohydrins *to provide epoxy-terminated surfaces* could not take place in the absence of base catalysts.

Regarding Schössler, the final office action states, “The use of catalysts is never mentioned in the method of Schössler. Therefore, based on the disclosure of Schössler, it would be clear to one of ordinary skill in the art that the gas-phase reaction of epoxy-functional molecules with hydroxyl groups is conducted in the absence of acid and base catalysts in the method of Schössler et al. as recited in the claims.” (Office Action, pages 9-10.) Applicants respectfully traverse.

Applicants do not dispute that Schössler fails to teach the use of an acid or base catalyst in conjunction with a reaction between gas-phase epoxy-functional molecules and hydroxyl groups. However, Schössler does fail to teach a reaction between epoxy groups on gas-phase epoxy-functional molecules and surface hydroxyl groups in the absence of acid and base catalysts to provide epoxy-terminated molecules, as recited in rejected claim 9. Rather, (at best) Schössler teaches reactions between silico groups on gas-phase organo silanes with hydroxyl groups in the absence of acid and base catalysts. Importantly, although the organo silanes of Schössler may include epoxy groups, those epoxy groups do not react with the hydroxyl groups in the reactions of Schössler. (See, for example, column 3 line 68 through column 4, line 3, which states, “Whereas the silico-functional group reacts with the accessible hydroxyl-groups of the solid bodies, the organo-functional group is available for the customary chemical reactions ...”.) Therefore, like Newsham, Schössler actually supports Applicants’ previous argument that, at the time of the present invention, the conventional wisdom was that epoxy groups on gas-phase epoxy-functional molecules would not react with hydroxyl groups in the absence of catalyst to provide epoxy-terminated molecules.

For at least the reason presented above, Applicants submit that claim 9 is patentable over the cited prior art and request that the rejection of claim 9 and all of the claims depending therefrom be withdrawn.

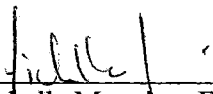
III. Provisional Double Patenting Rejections

The Office Action includes several provisional, non-statutory obviousness-type double patenting rejections over co-pending U.S. Patent Application Serial No. 11/609,045 in view of various secondary references. For the reasons presented above, the provisional, non-statutory obviousness-type double patenting rejections should be the only rejections remaining in the present application, which is the earlier filed of the two co-pending applications. Therefore, Applicants request that the Examiner withdraw the provisional double patenting rejection and permit the present application to issue.

The Applicants believe that the pending claims are now in condition for allowance. The Examiner is invited to contact the undersigned should further issues remain. Otherwise, speedy and favorable consideration is respectfully requested. The Director is authorized to charge Deposit Account No. 23-2053 for any fees required for the filing or to credit any overpayment. Any required petition should be considered provisionally made.

Respectfully submitted,

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